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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROLF BRUCK,
WOLFGANG MAUS, and
LUDWIG WIERES

Appeal 2008-0252
Application 10/014,265
Technology Center 1700

Decided: March 25, 2008

Before CHUNG K. PAK, THOMAS A. WALTZ, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1 through 39, all of the claims pending in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. § 6.

STATEMENT OF THE CASE

The subject matter on appeal is directed to a combustion engine assembly comprising a functionally defined catalytic converter (Spec. 4, ll. 12-16 and claim 1). According to pages 3 and 4 of the Specification, "the catalytic converter is constructed in such a way that it reaches a legally required high degree of effectiveness E, but has a significantly smaller volume V than a displacement H of the combustion engine..." Further details of the appealed subject matter are recited in representative claim 1 reproduced below:

1. A combustion engine assembly, comprising:

a combustion engine having a displacement and emitting exhaust gases; and

a catalytic converter disposed downstream of said combustion engine for cleaning the exhaust gases;

said catalytic converter having at least one honeycomb body with a total volume smaller than said displacement by at least a factor of 0.6; and

said catalytic converter having a geometric surface dimensioned to provide said catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components.

The Examiner has relied upon the following references:

Machida	5,455,012	Oct. 3, 1995
Abe	5,802,845	Sep. 8, 1998
Chalasani	6,080,345	Jun. 27, 2000 (Filed Jul. 15, 1998)
Otani '328	6,689,328 B1	Feb. 10, 2004 (Effective Date Mar. 6, 2000)
Otani '410	WO 98/51410	Nov. 19, 1998

The Examiner has rejected the claims on appeal as follows[1]:

1) Claims 1, 2, 13 through 21 and 32 through 39 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Abe, Machida and Chalasani; and

2) Claims 3 through 12 and 22 through 31 under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Abe, Machida, Chalasani and Otani '410[2].

The Appellants appeal from the Examiner's decision rejecting the claims on appeal under 35 U.S.C. § 103(a).

FACTS, PRINCIPLES OF LAW, ISSUES, AND ANALYSES

Under 35 U.S.C. § 103(a), the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary consideration (e.g., unexpected results). *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). "[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l v.*

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[1] The Examiner has withdrawn the 35 U.S.C. § 112, second paragraph, rejection of claims 1 through 39 set forth in the Final Office Action dated May 4, 2005 (Ans. 6).

[2] The Appellants do not question the Examiner's reliance on Otani '328 as corresponding to Otani '410 relied upon in the statement of rejection. Accordingly, our reference to Otani '410 is to the corresponding disclosure of Otani '328.

Teleflex, Inc., 127 S. Ct. 1727, 1740-41 (2007) *quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also DyStar Textilfarben GmBH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006)("The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself."). The common knowledge available to a person having ordinary skill in the art includes the Appellants' admission regarding what was known in the art at the time of the invention. *In re Nomiya*, 509 F.2d 566, 570-71 (CCPA 1975)(the admitted prior art in the Applicants' Specification may be used in determining the patentability of a claimed invention); *see also In re Davis*, 305 F.2d 501, 503 (CCPA 1962).

As evidence of obviousness of the subject matter defined by claims 1, 2, 13 through 21, and 32 through 39 under 35 U.S.C. § 103(a), the Examiner has relied on the combined disclosures of Abe, Machida, and Chalasani.[3] The Examiner finds, and the Appellants do not dispute, that:

> Abe et al discloses a combustion engine assembly comprising: a combustion engine having a displacement and emitting exhaust gases; a catalytic converter disposed downstream of the combustion engine for cleaning exhaust gas; said catalytic converter having at least one honeycomb body with a total volume smaller than the displacement by at least a factor of 0.6; and said catalytic converter having a geometric surface dimensioned to provide said catalytic converter with an effectiveness for converting at least one harmful component in the exhaust gasses into harmless components. [*Compare* Ans. 3 with App. Br. 6-12 and Reply Br. 1-5.]

[3] We limit our discussion to claim 1 consistent with 37 C.F.R. § 41.37(c)(1)(vii) (2005).

The Examiner recognizes that Abe does not mention the claimed functionally defined structural limitation "a geometric surface dimensioned to provide said catalytic converter with an effectiveness of more than 98% for converting a least one harmful component in the exhaust gases into harmless components" recited in claim 1.

To remedy this deficiency, the Examiner relies on the disclosure of Machida to show that the optimization of the geometric surface dimensions of Abe's catalytic converter to obtain the claimed effectiveness is well within the ambit of one of ordinary skill in the art. On the other hand, the Appellants contend that one of ordinary skill in the art would not have been led to optimize the surface dimensions of Abe's catalytic converter to obtain the claimed effectiveness. In support of this position, the Appellants refer to Machida's Figures 10 and 11 which shows the effect of partition wall thicknesses and cell densities of catalytic substrates, respectively on the conversion efficiencies.

The dispositive question is, therefore, whether one of ordinary skill in the art would have been led to optimize the geometric surface dimensions of Abe's catalytic converter, such as partition wall thicknesses and cell densities of catalytic substrates, with a reasonable expectation of successfully obtaining a catalytic converter having geometric surface dimensions capable of providing at least 98% effectiveness within the meaning of 35 U.S.C. § 103. On this record, we answer this question in the affirmative.

As acknowledged by the Appellants (Spec. 2):

> [T]oday in most countries more than 98%, and preferably even more than 99%, of the harmful content of the exhaust gas, in

> particular the hydrocarbon substances and/or nitrous oxide, are converted into harmless components.

We find that Machida and Chalasani provide an ample guidance to obtain such desired effective conversion. As found by the Examiner (Ans. 4), Machida's Figures 10 and 11 show by increasing the cell density and decreasing the partition wall thickness of a catalytic converter, the HC purification efficiency percentages can be significantly increased. *See also* Machida, col. 4, ll. 13-24 and col. 10, l. 64 to col. 11, l. While decreasing the partition wall thickness from 0.2mm to 0.15 mm and then to 0.1 mm continues to improve the HC purification efficiency from 86% to 90%, increasing the cell density from 30 cells/cm^2 to 65 cells/cm^2 and then to 100 cells/cm^2 continues to improve the HC purification efficiency from 85% to 90%. *See* Machida, Figures 10 and 11. In other words, Machida's Figures 10 and 11 not only demonstrates a trend of increasing the HC purification efficiency as the partition wall thickness decreases and the cell density increases, but also implies a greater HC purification efficiency from the combined effect of decreasing the partition wall thickness and increasing the cell density of a catalytic converter. Thus, we determine that one of ordinary skill in the art would have reasonably expected from the above disclosure of Machida that the combined effect of *significantly* decreasing the partition wall thickness and *significantly* increasing the cell density would have resulted in the higher desired HC purification efficiency, e.g., higher than 98%, in compliance with the environmental requirement of most countries . This is especially true in this case since Chalasani teaches employing a catalytic converter (honeycomb) having an increased cell density of 235 cells/cm^2 (1500cells/in^2) to about 94 cells/cm^2 (about 600 cells/in^2) with a

partition wall thickness of 0.02 to 0.048 mm (20 to 48 microns) as required by the claims on appeal for more than 98% effectiveness consistent with the teachings of Machida. *Compare* Chalasani, col. 11, ll. 46-58, with, e.g., dependent claims 2, 13 through 16, 19 through 21, and 34 through 39. The Appellants' arguments to the contrary are not persuasive since they do not take into account the combined effect and the trend suggested by Machida and the claimed dimensions useful for 98% effectiveness taught by Chalasani consistent with the suggestion of Machida.

Accordingly, for the reasons set forth above, we concur with the Examiner that one of ordinary skill in the art would have been led to optimize the geometric surface dimensions of Abe's catalytic converter, such as its partition wall thickness and cell density, with a reasonable expectation of successfully maximizing the effectiveness of its catalytic converter, i.e., geometric surface dimensions capable of providing at least 98% effectiveness, within the meaning of 35 U.S.C. § 103.[4] *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) ("[D]iscovery of an optimum value of a result effective variable…is ordinarily within the skill of the art."); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)("[W]here the general conditions of a

[4] At the hearing dated March 12, 2008, the Appellants' representative acknowledged that the claimed functional limitation "a geometric surface dimensioned to provide said catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components" encompasses any and all structure for performing the claimed function, including those not described in the Specification. According to the Appellants' representative, once the desired effectiveness is known, one of ordinary skill in the art would have been able to employ any and all structure capable of performing the claimed effectiveness. To argue otherwise would be to acknowledge that the claimed subject matter as broadly written may not have been enabled by the Specification.

claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.").

As evidence of obviousness of the subject matter defined by claims 3 through 12 and 22 through 31 under 35 U.S.C. § 103, the Examiner relies on the combined disclosures of Abe, Machida, Chalasani and Otani '410. The Appellants do not dispute the Examiner's determination at pages 5 and 6 of the Answer that:

> It would have been obvious to one having ordinary skill in the art to select an appropriate material for the honeycomb body, such as metal sheet layers as taught by Otani et al in the modified apparatus of Abe et al, on the basis of its suitability for the intended use … and since such a modification would have involved a mere substitution of known equivalent structures.

The Appellants only contend that Otani '410 does not teach the claimed geometric dimensions capable of performing more than 98% effectiveness and therefore, it does not remedy the deficiencies of Abe, Machida, and Chalasani (Br. 12-13). Accordingly, based on the same factual findings set forth above, we concur with the Examiner that the combined disclosures of Abe, Machida, Chalasani and Otani '410 would have rendered the subject matter of claims 3 through 12 and 22 through 31 obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103(a).

ORDER

In view of the foregoing, the decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(effective Sept. 13, 2004).

AFFIRMED

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